

May-June-2012

[4161] - 110



Seat No.	
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F.E. (Semester – II) Examination, 2012  
ENGINEERING MECHANICS  
(2008 Pattern)



Time : 2 Hours

Max. Marks : 50

- Instructions :**
- 1) Attempt Q. 1 or Q. 2, Q. 3 or Q. 4 and Q. 5 or Q. 6.
  - 2) Answer should be written in **one** answer book.
  - 3) **Neat** diagrams must be drawn **wherever** necessary.
  - 4) Figures to the **right** indicate **full** marks.
  - 5) Assume suitable data, **if necessary** and **clearly** state.
  - 6) Use of cell phone is **prohibited** in the examination hall.
  - 7) Use of electronic pocket calculator is **allowed**.

1. a) Resolve the 60 N force in to components acting along the u and v axes and determine the magnitudes of the components. Refer Fig. 1 a. 6
- b) If block A of the pulley system is moving downward with a speed 1 m/s while block C is moving up at 0.5 m/s, determine the speed of block B. Also determine the relative velocity of A with respect to C. Refer Fig. 1 b. 6

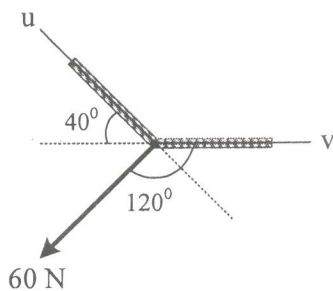


Fig. 1 a

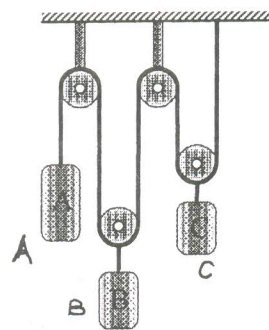


Fig. 1 b

OR

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2. a) Determine the distance  $y$  to the centroid of the trapezoidal area in terms of the dimensions shown in Fig. 2 a. 6
- b) The 400 Kg mine car is hoisted up the incline using the cable and motor M. For a short time, the force in the cable is  $F = (3200 t^2)$  N, where  $t$  is in seconds. If the car has an initial velocity  $v_0 = 2$  m/s when  $t = 0$ , determine the distance it moves up the plane when  $t = 2$  s. Ref. Fig. 2 b. 6

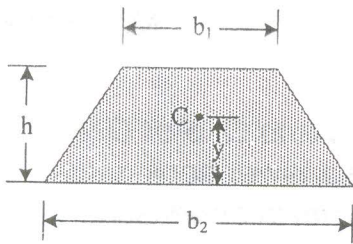


Fig. 2 a

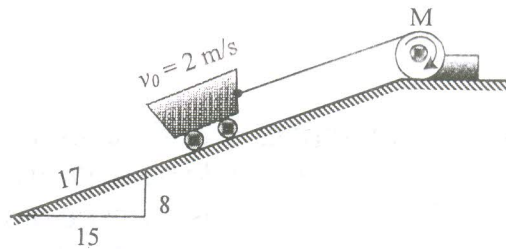


Fig. 2 b

3. a) The 500 N crate is hoisted using the ropes AB and AC. Each rope can withstand a maximum tension of 2500 N before it breaks. If AB always remains horizontal, determine the smallest angle  $\theta$  to which the crate can be hoisted. Refer Fig. 3 a. 6
- b) Three parallel bolting forces act on the rim of the circular cover plate of radius  $r = 0.8$  m as shown in Fig. 3 b. Determine the magnitude and direction of a resultant force equivalent to the given force system and locate its point of application on the cover plate. 7
- c) A rocket follows a path such that its acceleration is defined by  $\mathbf{a} = (4\mathbf{i} + t\mathbf{j})$  m/s<sup>2</sup>. If it starts from rest at  $\mathbf{r} = \mathbf{0}$ , determine the speed of the rocket and the radius of curvature of its path when  $t = 10$  s. 6

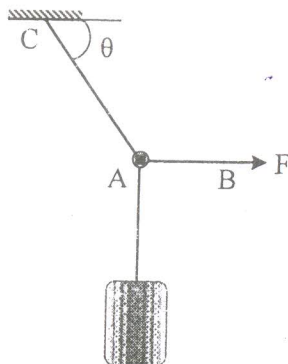


Fig. 3 a

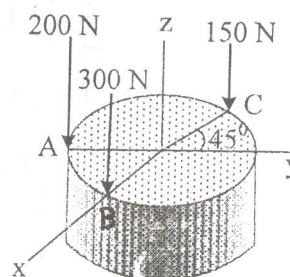


Fig. 3 b

OR

